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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/800,219	03/12/2004	Nadya G. Strelkova	03-2396	8549

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EXAMINER

LAM, NELSON C

ART UNIT	PAPER NUMBER
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2825

DATE MAILED: 07/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/800,219

Applicant(s)

STRELKOVA ET AL.

Examiner

Nelson Lam

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 May 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input checked="" type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Applicants' amendment to 10/800,219 has been examined. The title has been amended. The specification has been amended. The drawings have been amended. Claims 1-11 and 13-18 have been amended. Claims 1-18 are pending.

Applicants' amendment is considered persuasive in part and the applicable rejections from the prior office action along with new ground of rejection are incorporated herein.

Drawings

2. New corrected drawings in compliance with 37 CFR 1.121(d) are required in this application because see form PTO-948. Applicant is advised to employ the services of a competent patent draftsman outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. **Claims 1-2 and 6 are rejected under 35 U.S.C. 102(e)** as being anticipated by Weed (US Patent No. 6,658,640).

As per **claim 1**, Weed discloses a method for verifying post-optical proximity corrected mask wafer image sensitivity to reticle manufacturing errors (col. 7, line 19-44), said method comprising: statistically modifying layout polygons based on reticle critical dimension specifications to construct a statistical virtual mask (Fig. 1; col. 1, line 22-38; col. 5, line 52-59; Fig. 3, #312; col. 6, line 9-34; col. 7, line 19-31; where mask map #312 is a statistical virtual mask); obtaining virtual mask image response function statistical parameters (Fig. 1; Fig. 2, #203; col. 4, line 38-60); and comparing the statistical parameters to process tolerance requirements (Fig. 4, #425; col. 8, line 53-63).

As per **claim 2**, Weed discloses a method as recited in claim 1, further comprising forming an simulated image of the statistical virtual mask (Fig. 3, #303; col. 4, line 61-67; col. 5, line 1-9).

As per **claim 6**, Weed discloses a method as recited in claim 1, further comprising obtaining the statistical virtual mask by using reticle critical dimension specifications to induce reticle manufacturing statistical variations to layout which have passed through an optical proximity correction procedure (Fig. 1; col. 1, line 22-38; col. 6, line 9-34; col. 7, line 19-31).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 3-5 and 7-9 are rejected under 35 U.S.C. 103(a)** as being unpatentable over Weed in view of Mansfield et al. (US Patent No. 6,421,820). Weed discloses a method of optimizing a mask for wafer fabrication. However, Weed does not disclose mask optimization using aerial images, moving fragments of a polygon and re-sizing primitives. Mansfield also discloses a method of optimizing a mask for wafer fabrication that includes using aerial images, moving fragments of a polygon and re-sizing primitives that Weed does not disclose. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include using aerial images, moving fragments of a polygon and re-sizing primitives in the method of Mansfield in the method of Weed since including these features would represent an improvement in the method of Weed (col. 4, line 30-37).

As per **claim 3**, Weed in view of Mansfield discloses a method as recited in claim 2, further comprising calculating response functions based on the simulated image (Mansfield: Fig. 4B; col. 4, line 30-38; col. 4, line 66-67; col. 5, line 1-4).

As per **claim 4**, Weed in view of Mansfield discloses a method as recited in claim 3, further comprising collecting simulated image critical dimensions and calculating statistical parameters based on the response functions (Weed: Fig. 3, #312; col. 5, line 52-59; col. 6, line 1-9).

As per **claim 5**, Weed in view of Mansfield discloses a method as recited in claim 4, further comprising comparing the simulated wafer critical dimension distributions with process tolerance requirements (Weed: Fig. 4, #425; col. 8, line 53-67; col. 9, line 1-27).

As per **claim 7**, Weed in view of Mansfield discloses a method as recited in claim 6, further comprising at least one of moving fragments of a polygon and re-sizing primitives of a post-optical proximity correction polygon (Mansfield: col. 3, line 1-9; Fig. 3A, 3B, 4A, 4B; Fig. 5; col. 4, line 52-58; col. 5, line 5-10; col. 5, line 19-23; col. 4, line 22-29).

As per **claim 8**, Weed in view of Mansfield discloses a method as recited in claim 6, further comprising moving fragments of a post-optical proximity correction polygon based on a randomly generated number from a reticle critical dimension specification (Mansfield: Fig. 6; col. 5, line 24-44).

As per **claim 9**, Weed in view of Mansfield discloses a method as recited in claim 6, further comprising re-sizing primitives depending on a reticle critical dimension specification (Weed: col. 2, line 4-51) (Mansfield: col. 3, line 1-9; Fig. 3A, 3B, 4A, 4B; Fig. 5; col. 4, line 52-58; col. 5, line 5-10; col. 5, line 19-23; col. 4, line 22-29).

7. **Claim 10 and 11 are rejected under 35 U.S.C. 103(a)** as being unpatentable over Mansfield et al. in view of Balasinski et al. (US Patent No. 6,562,638). Mansfield discloses a method of optimizing a wafer mask by adjusting drawing features of a mask pattern. However, Mansfield does not disclose a method of predicting yield. Balasinski also discloses a method of optimizing a mask by adjusting drawing features of a mask pattern that includes a method of predicting yield that Mansfield does not disclose.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the method of predicting yield of Balasinski to the method of Mansfield since this would represent an improvement in the invention of Mansfield (col. 7, line 14-21).

As per **claim 10**, Balasinski discloses a yield prediction tool for mask quality specifications (Abstract; Fig. 24; col. 6, line 45-61; col. 7, line 52-64), said tool comprising means for statistically modifying layout polygons based on reticle critical dimension specifications to construct a statistical virtual mask (Weed: Fig. 1; col. 1, line 22-38; col. 6, line 9-34; col. 7, line 19-31), means for obtaining virtual mask imaging response function statistical parameters (Weed: Fig. 2; col. 4, line 38-60); and means for comparing the statistical response to process tolerance requirements (Weed: Fig. 4, #425; col. 8, line 53-63).

As per **claim 11**, Mansfield discloses a tool as recited in claim 10, further comprising means from simulating an aerial and/or latent image of the statistical formed virtual mask (Mansfield: Fig. 4B; col. 4, line 30-38; col. 4, line 66-67; col. 5, line 1-4).

8. **Claims 12-18 are rejected under 35 U.S.C. 103(a)** as being unpatentable over Mansfield et al. in view of Balasinski et al. in further view of Weed. Mansfield and Balasinski discloses a method of optimizing a mask by adjusting drawing features of a mask pattern. However, Mansfield and Balasinski do not disclose optimizing a mask that includes using CD distributions and statistical parameters. Weed also discloses a method of optimizing a mask by adjusting drawing features of a mask pattern that includes using CD distributions and statistical parameters that Mansfield and Blasinski

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do not disclose. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the method of using CD distributions and statistical parameters of Weed in the method of Mansfield and Balasinski since this would represent an improvement in the invention of Mansfield and Balasinski (Mansfield: col. 7, line 14-21; Balasinski: col. 9, line 6-10).

As per **claim 12**, Weed discloses a tool as recited in claim 11, further comprising means for calculating response functions based on the simulated image (Weed: Fig. 3, #312; col. 5, line 52-59; col. 6, line 1-9).

As per **claim 13**, Weed discloses a tool as recited in claim 12, further comprising means for collecting simulated image critical dimensions and calculating statistical parameters based on the response functions (Weed: Fig. 3, #312; col. 5, line 52-59; col. 6, line 1-9).

As per **claim 14**, Weed discloses a tool as recited in claim 13, further comprising means for comparing simulated wafer critical dimension distributions with process tolerance requirements (Weed: Fig. 4, #425; col. 8, line 53-63).

As per **claim 15**, Weed discloses a tool as recited in claim 10, further comprising means for obtaining the statistical virtual mask by using reticle critical dimension specifications to statistically vary layouts which have passed through an optical proximity correction procedure (Weed: Fig. 1; col. 1, line 22-38; col. 6, line 9-34; col. 7, line 19-31).

As per **claim 16**, Mansfield discloses a tool as recited in claim 15, further comprising means for at least one of moving fragments of a polygon and re-sizing

primitives of a post-optical proximity correction polygon (Mansfield: col. 3, line 1-9; Fig. 3A, 3B, 4A, 4B; Fig. 5; col. 4, line 52-58; col. 5, line 5-10; col. 5, line 19-23; col. 4, line 22-29).

As per **claim 17**, Mansfield discloses a tool as recited in claim 15, further comprising means for moving fragments of a post-optical proximity correction polygon based on a randomly generated number from a recticle critical dimension specification (Mansfield: Fig. 6; col. 5, line 24-44).

As per **claim 18**, Weed discloses a tool as recited in claim 15, further comprising means for re-sizing primitives depending on a recticle critical dimension specification (Weed: col. 3, line 1-9; Fig. 3A, 3B, 4A, 4B; Fig. 5; col. 4, line 52-58; col. 5, line 5-10; col. 5, line 19-23; col. 4, line 22-29).

Remarks

9. Applicants state that the references of Weed, Mansfield and Balasinski does not disclose a method for verifying post-optical proximity corrected mask wafer image sensitivity to recticle manufacturing errors. However, the Examiner respectfully disagrees as the Weed reference recites the individual limitations for verifying post-optical proximity corrected mask wafer image sensitivity to recticle manufacturing errors based on the identified and referenced explanatory cites in the non-final and instant office action. Therefore, the rejections under 35 USC 102(e) and 35 USC 103(a) are maintained.

Conclusion

10. Applicants' amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

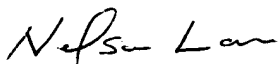
11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nelson Lam whose telephone number is 571 272-8318. The examiner can normally be reached on Monday-Friday from 9am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Chiang can be reached on 571 272-7483. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

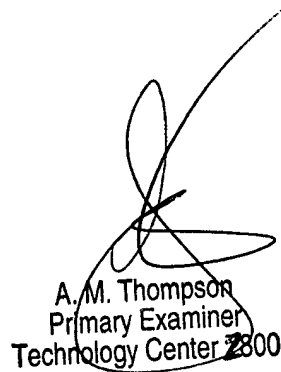
Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

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Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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